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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,803	11/20/2002	Chun-Jen Weng	JCLA9605	6568
23900	7590	04/30/2004	EXAMINER	
J C PATENTS, INC. 4 VENTURE, SUITE 250 IRVINE, CA 92618			ESTRADA, MICHELLE	
			ART UNIT	PAPER NUMBER
			2823	
DATE MAILED: 04/30/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/065,803	Applicant(s) WENG ET AL.	
	Examiner Michelle Estrada	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-10 and 12-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-10 and 12-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/3/04 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ho et al. (6,184,138) and Zhao et al. (6,100,184).

Ho et al. disclose providing a substrate (10) having a dielectric layer (16) thereon, wherein the dielectric layer has an opening (12) therein forming a gap-filling material layer (24) over the dielectric layer and inside the opening (See fig. 3a); removing a portion of the gap-filling material from the gap-filling material layer to expose the dielectric layer (16/18); and conducting a gap-filling material

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treatment on the gap-filling material layer and the dielectric (Col. 6, lines 35-40); wherein the gap-filling material treatment includes etching the dielectric layer and the gap-filling material by chemical-mechanical polishing to remove a portion of the dielectric layer and the gap-filling material layer and hence planarizing the gap-filling material layer; wherein the gap-filling material treatment includes forming a protective layer (30) over the gap-filling material layer; wherein the material constituting the gap-filling material layer is a bottom anti-reflection coating; wherein the step of forming the gap-filling material layer includes spin coating (Col. 6, lines 12-20); wherein after the step of treating the gap-filling material on the gap-filling material layer and the dielectric layer, further includes forming a bottom anti-reflection coating (30) over the gap-filling material layer and the dielectric layer; wherein the opening is a dual damascene opening.

Ho et al. do not disclose wherein the protective layer is not formed over the entire substrate but formed on the exposed surface of the gap-filling material layer.

Zhao et al. disclose providing a dielectric layer (14/18) with an opening; forming a gap filling material layer (29) over the dielectric layer and inside the opening; removing a portion of the gap-filling material; and forming a protective layer (34) on the exposed surface of the gap-filling material layer, wherein the protective layer is not formed over the entire substrate but formed on the exposed surface of the gap-filling material layer (See fig. 16).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Ho et al. and Zhao et al. to enable the protective layer

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formation step of Ho et al. to be performed according to the teachings of Zhao et al. because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the disclosed protective layer formation step of Ho et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ho et al. and Zhao et al. as applied to claims 1 and 5-9 above, and further in view of Mandal (6,541,367).

The combination of Ho et al. and Zhao et al. does not disclose forming the protective layer by a plasma treatment.

Mandal discloses providing a substrate (504) having a dielectric layer (510/514) thereon, wherein the dielectric layer has an opening (520) therein forming a gap-filling material layer (524) over the dielectric layer and inside the opening (See fig. 8G); removing a portion of the gap-filling material from the gap-filling material layer to expose the dielectric layer (516); and conducting a gap-filling material treatment on the gap-filling material layer; forming a protective layer (518) over the resultant structure by a plasma treatment (Col. 10, lines 9-10).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Ho et al., Zhao et al. and Mandal to enable the protective layer formation step of Ho et al. and Zhao et al. to be performed according to the teachings of ref Mandal because one of ordinary skill in the art

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would have been motivated to look to look to alternative suitable methods of performing the disclosed protective layer formation step of Ho et al. and Zhao et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Claims 10, 12-14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Mandal (6,541,367) and Zhao et al. (6,100,184).

Mandal discloses providing a substrate (504); sequentially forming a protective layer (508), a first dielectric layer (510), an etching stop layer (512), a second dielectric layer (514) and a cap layer (516/517) over the substrate; forming a via opening (520) passing through the first dielectric layer, the etching stop layer, the second dielectric layer and the cap layer (See fig. 8E); forming a gap-filling material layer (524) over the cap layer and inside the via opening; removing a portion of the gap-filling material from the gap-filling material layer to expose the cap layer; and conducting a gap-filling material treatment on the gap-filling material layer and the cap layer (Col. 17, lines 30-55 and fig. 8H); wherein the gap-filling material treatment includes etching the cap layer and the gap-filling material layer to remove a portion of the cap layer and the gap-filling material layer and hence planarizing the gap-filling material layer; wherein the gap-filling material treatment includes forming a protective layer (518) over the gap-filling material layer by conducting a plasma treatment; wherein steps for treating the gap-filling material includes: etching the cap layer and the gap-filling material

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layer; and forming a protective layer over the gap-filling material layer by conducting a plasma treatment; wherein the step of removing a portion of the gap-filling material from the gap-filling material layer includes chemical-mechanical polishing; wherein after the step of treating the gap-filling material on the gap-filling material layer and the cap layer, further includes forming a bottom anti-reflection coating (518) over the gap-filling material layer and the dielectric layer.

Mandal et al. do not disclose wherein the protective layer is not formed over the entire substrate but formed on the exposed surface of the gap-filling material layer.

Zhao et al. disclose providing a dielectric layer (14/18) with an opening; forming a gap filling material layer (29) over the dielectric layer and inside the opening; removing a portion of the gap-filling material; and forming a protective layer (34) on the exposed surface of the gap-filling material layer, wherein the protective layer is not formed over the entire substrate but formed on the exposed surface of the gap-filling material layer (See fig. 16).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Mandal and Zhao et al. to enable the protective layer formation step of Mandal to be performed according to the teachings of Zhao et al. because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the disclosed protective layer formation step of Mandal and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

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Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Mandal and Zhao et al. as applied to claims 10, 12-14 and 17 above, and further in view of Ho et al.

The combination of Mandal and Zhao et al. does not disclose wherein the step of forming the gap-filling material layer includes spin coating; and wherein material constituting the gap-filling material layer is a bottom anti-reflection coating.

Ho et al. disclose forming a gap-filling material constituting a bottom anti-reflection material and spin coating the material (Col. 6, lines 12-20).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Mandal, Zhao et al. and Ho et al. to enable formation of the gap-filling material and further the spin on material protects the inside surfaces of the dual damascene structure during subsequent processing steps (Col. 6, lines 18-20).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone numbers for the organization where this application or proceeding is

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assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.



MEstrada
April 22, 2004



George Fourson
Primary Examiner
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